WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, comprising the steps of:

forming a soluble thin film which is soluble in a dissolving liquid on a film to be processed which is formed on a semiconductor substrate;

forming a mask layer on the soluble thin film;

forming a resist pattern on the mask layer;

etching the mask layer using the resist pattern as a mask to form a mask pattern;

etching the soluble thin film and the film to be processed using the mask pattern as at least a portion of a mask; and

dissolving the etched soluble thin film in the dissolving liquid, thereby lifting off the mask pattern from the film to be processed.

2. A method according to claim 1, wherein the soluble thin film contains at least one compound selected from the group consisting of tungsten oxide, aluminum oxide, titanium oxide, and titanium nitride.

3. A method according to claim 1, wherein the dissolving liquid is either water or alkaline solution.

4. A method according to claim 1, wherein the step of etching the soluble thin film and the film to be processed comprises forming a contact hole in the film to be processed.

5. A method according to claim 1, wherein the

step of forming the resist pattern comprises forming a resist film with a thickness of 0.3 μm or more on the mask layer and patterning the resist film by photolithography technique to form the resist pattern.

6. A method of manufacturing a semiconductor device, comprising the steps of:

forming a soluble thin film which is soluble in a dissolving liquid on a film to be processed which is formed on a semiconductor substrate;

forming a first mask pattern on the soluble thin film;

forming a mask layer on the first mask pattern such that an exposed portion of the soluble thin film is covered with the mask layer;

etching back the mask layer such that an upper face of the first mask pattern is exposed and the portion of the mask layer covering the exposed portion of the soluble thin film remains to form a second mask pattern;

removing the first mask pattern;

etching the soluble thin film and the film to be processed using the second mask pattern as a mask; and

dissolving the etched soluble thin film in the dissolving liquid, thereby lifting off the second mask pattern from the film to be processed.

7. A method according to claim 6, wherein the soluble thin film contains at least one compound

selected from the group consisting of tungsten oxide, aluminum oxide, titanium oxide, and titanium nitride.

8. A method according to claim 6, wherein the dissolving liquid is either water or alkaline solution.

9. A method according to claim 6, wherein the step of forming the first mask pattern comprises:

forming a first mask layer;

forming a resist film with a thickness of 0.3 μm or less on the first mask layer;

patterning the resist film by using photolithography technique to form a resist pattern; and

etching the first mask layer using the resist pattern as a mask, thereby forming the first mask pattern.

10. A method according to claim 7, wherein the step of etching the soluble thin film and the film to be processed comprises forming a contact hole in the film to be processed.

11. A method of manufacturing a semiconductor device, comprising the steps of:

forming a soluble thin film which is soluble in a dissolving liquid on a first insulating film which is formed on a semiconductor substrate;

forming a resist pattern on the soluble thin film;

etching the soluble thin film using the resist pattern as a mask to form a wiring groove;

removing the resist pattern after the step of

forming the wiring groove;

forming a wire in the wiring groove in an embedding manner;

forming a second insulating film on the wiring and the soluble thin film;

forming a window portion in the second insulating film such that the soluble thin film is exposed at a bottom of the window portion; and

dissolving the soluble thin film in the dissolving liquid to remove the soluble thin film.

12. A method according to claim 11, wherein the soluble thin film contains at least one compound selected from the group consisting of tungsten oxide, aluminum oxide, titanium oxide, and titanium nitride.

13. A method according to claim 11, wherein the dissolving liquid is either water or alkaline solution.

14. A method according to claim 11, wherein the step of removing the soluble thin film comprises causing the dissolving liquid to contact with the soluble thin film through the window portion.

15. A method according to claim 11, further comprising the step of forming a lower wiring in the first insulating film in an embedding manner prior to the step of forming the soluble thin film.

16. A method according to claim 15, further comprising the step of forming a via hole reaching the lower wiring in a bottom of the wiring groove between

the step of forming the wiring groove and the step of forming the wire in the embedding manner, wherein the step of forming the wire in the embedding manner comprises forming a plug electrode in the via hole.

17. A method of manufacturing a semiconductor device, comprising the steps of:

forming an organosilicon compound film on a semiconductor substrate;

forming a silicon oxide film on the organosilicon compound film;

forming a resist pattern on the silicon oxide film;

etching the organosilicon compound film and the silicon oxide film using the resist pattern as a mask; and

dissolving the etched silicon oxide film in the dissolving liquid, thereby lifting off the resist pattern from the organosilicon compound film.

18. A method according to claim 17, wherein the silicon oxide film is formed by supplying gas containing activated oxygen on a surface of the organosilicon compound film.

19. A method according to claim 17, wherein the dissolving liquid is diluted hydrofluoric acid.

20. A method according to claim 17, wherein the organosilicon compound film is a SOG film.

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